FCS14 - SOP for the Analysis and Reporting of Suspected Marijuana

Table of Contents

1. Scope

1.1. This document establishes the procedures for the analytical techniques used to sample, identify, and report suspected Marijuana samples. This procedure is based on *SWGDRUG Supplemental Document SD-2* and compliant with the *Forensic Science Laboratory (FSL) Quality Assurance Manual*.

2. Background

2.1. To establish a procedure for sampling as well as the characterization of the Marijuana plant, including seeds and leaf, in support of casework results.

2.2. Macroscopic and Microscopic Characteristics

2.2.1. Upright stalk attains a height of 3-16 feet, average 4-6 feet.

2.2.2. Stalk varies in diameter up to two inches, averages less than one half inch.

2.2.3. One main tap root up to eight inches long. Smaller branches from the main root.

2.2.4. Plant has a characteristic odor.

2.2.5. Distinction between male and female plants is difficult except at maturity.

2.2.5.1. Male: flowers are very prominent; mature ones shed pollen

profusely.

2.2.5.2. Female: flowers are inconspicuous and are found hidden among the small leaves at the ends of the stalk and branches.

2.2.6. Leaves

2.2.6.1. Plant has compound palmate leaves with 5-11 leaflets (usually seven), and odd in number.

2.2.6.2. Leaf is similar in shape to a hand.

2.2.6.3. Leaflets are pointed at both ends and vary up to about six inches length and to about 1.5 inches in width.

2.2.6.4. Green, brown-spotted, or brown in color.

2.2.6.5. Characteristically serrated.

2.2.6.6. Veins end at sharp point of each serration or notch, best seen from the underside.

2.2.6.7. Cystolithic hairs on upper side.

2.2.6.8. Longer, sharper pointed hairs on underside.

2.2.6.9. Note: Smaller, single leaflet or non-serrated leaves can be found growing out of the buds (sugar leaves) or surrounding the seeds in flowering plants (bracts).

2.2.7. Stems

2.2.7.1. Fluted

2.2.7.2. The plant branches at the nodes – a branch appearing immediately above each leaf. The branches occur at opposite points on the stalk with alternate pairs situated at right angles.

2.2.8. Seeds (fruit)

2.2.8.1. Greenish-yellow to brown in color.

2.2.8.2. Lacy, mottled appearance like a melon or a turtle’s back.

2.2.8.3. Ovoid in shape.

2.2.8.4. Ridge around the greatest circumference.

2.2.8.5. Inside similar to coconut meat.

2.2.9. Hulls (pods) - found on outside of seeds

2.2.9.1. Green, brown or brown-spotted in color.

2.2.9.2. Characteristically shaped.

2.2.9.3. Cystolithic and glandular hairs on outer surface.

2.2.10. Hairs (Trichomes)

2.2.10.1. Cystolithic Hairs

2.2.10.1.1. Characteristic “warty” appearance; look like bear claws.

2.2.10.1.2. Sphere of calcium carbonate at the base of the hair which effervesces in dilute hydrochloric acid.

2.2.10.1.3. No plant which fails to show them can be characterized as marijuana.

2.2.10.2. Glandular Hairs

2.2.10.2.1. Wooly Appearance; look like clubs with flattened, spherical heads.

3. Safety

3.1. Protective Equipment:

3.1.1. Personnel should wear personal protective equipment (PPE) including: lab coat, gloves, and safety goggles when carrying out standard operating procedures.

3.1.2. Wear vinyl or nitrile gloves when handling Marijuana plant material.

3.2. Training:

3.2.1. Formal training on the visual inspection of Marijuana characteristics is necessary.

3.3. Personal Hygiene:

3.3.1. Universal Precautions must be followed. Care should be taken when handling instrument, chemicals or any biological specimen. Routine use of gloves and proper hand washing should be practiced. Refer to *DOM13 – DFS Health and Safety Manual.*

3.4. Disposal of Waste:

3.4.1. Waste materials must be disposed of in compliance with laboratory requirements, Federal, state, and local regulations. Consult DFS Safety Officer for proper procedures.

4. Materials Required

4.1. Equipment

4.1.1. Microscope (LEICA EZ4 or equivalent)

4.1.2. Gas Chromatograph/Mass Spectrometer (GC-MS) and Gas Chromatograph/Flame Ionization Detector (GC-FID)

4.2. Chemicals

4.2.1. Duquenois-Levine Color Test Reagent

4.2.2. Hydrochloric Acid (HCl)

4.2.3. Chloroform ($CHCl_3$)

4.2.4. Methanol (MeOH)

5. Standards and Controls

5.1. Standards used for the detection of any controlled substances shall meet reference material criteria as outlined in *FCS02 – SOP for General Laboratory Procedures*.

6. Calibration

6.1. Balances used for weight measurements shall be calibrated annually (i.e., once per calendar year) by an approved external ISO/IEC 17025 accredited vendor.

7. Procedures

7.1. General Procedure

7.1.1. Plant material shall be viewed macroscopically and microscopically to verify the presence of visually recognizable morphological characteristics. A microscope shall be used for the identification of cystolithic hairs.

7.1.2. Macroscopic and microscopic characteristics present in the exhibit shall be documented on the case notes.

7.2. Identification Criteria

7.2.1. Minimum acceptance criteria for the characterization of the Marijuana plant shall include:

7.2.1.1. A positive Duquenois-Levine color test. **AND**

7.2.1.2. A combination of at least the following macroscopic and microscopic characteristics:

7.2.1.2.1. Leaf/leaf fragment(s) and cystolithic hairs **OR**

7.2.1.2.2. Stem(s) and cystolithic hairs **OR**

7.2.1.2.3. Seed(s) and cystolithic hairs

7.2.1.3. Analytical detection of Tetrahydrocannabinol (THC) meeting identification criteria as defined in *FCS01 – SOP for Detecting Controlled Dangerous Substances.*

7.2.2. For material that does not meet the acceptance criteria for 7.2.1.1. and 7.2.1.2 but meets the criteria for the analytical detection of THC (see section 7.2.1.3.), the conclusion shall not identify marijuana, but shall indicate the detection of THC (or other confirmable controlled dangerous substances present).

7.2.3. For material that meets the acceptance criteria for 7.2.1.1. and 7.2.1.2 but does not meet the criteria for the analytical detection of THC (see section 7.2.1.3.), or when THC is a very minor component in the sample (as evaluated by the analyst based on the relative abundance in GC-MS), the conclusion shall not identify marijuana.

7.3. Operating and Maintaining Microscopes

7.3.1. Preventive maintenance shall be performed as per manufacturer recommendations, or annually (i.e., once per calendar year) if unavailable, by an approved external vendor.

7.3.2. Microscopes shall be visually examined for operability prior to using.

7.3.3. Best practice includes use of a dust cover between uses.

7.3.4. As needed, the analyst shall clean the stage, clean the eye piece and replace light bulb.

8. Sampling

8.1. Weight determination for suspected Marijuana

8.1.1. The weight shall, in general, be taken as per guidance from *FCS01 – SOP for Detecting Controlled Dangerous Substances*.

8.1.2. If a sample is determined to have characteristics consistent with the known characteristics of the Marijuana plant (outlined in 7.4.), there are two exceptions, in support of *DC Code §48-904.01*, specifically for the cut-off value for a misdemeanor of net weight 1 ounce (1 oz, or 28 grams), or for a felony of net weight of ½ pound (1/2 lb, or 226 grams).

8.1.2.1. Sample Size One Ounce or More:

8.1.2.1.1. When the combined gross weight of all units within an exhibit is less than one ounce (1 oz) or 28 grams, then only the net weight of one representative sample (the analyzed unit) shall be taken. The combined gross weight of not analyzed units will be documented in the case

notes and reported.

8.1.2.1.2. If the combined gross weight of all units is at or above one ounce (1 oz, or 28 grams), then all not analyzed units shall be combined and a composite made, with the combined net weight determined and reported. The analysis shall be of the original unit not added to the composite.

8.1.2.2. Sample Size One-Half Pound or More:

8.1.2.2.1. If the gross weight is at or above one-half pound (1/2 lb) or 226 grams, then all not analyzed units shall be combined and a composite made, with the combined net weight determined and reported. The analysis shall be of the original unit not added to the composite.

8.1.3. In situations where the number of items is exceptionally large, per analyst discretion, a statistical, representative sampling (i.e., Hypergeometric Sampling) of items may be taken (following *FCS02 - SOP for General Laboratory Procedures*), a single composite made, and tested.

8.1.3.1. The total weight shall be estimated from a statistical estimate based off at least five (5) representative samples, applied over the entire number of test items. All mathematical calculations shall be recorded in the case notes and reviewed by the technical reviewer for accuracy.

9. Calculations

9.1. Calculations performed for weights shall be rechecked by the analyst to ensure accurate data transcription. Conversions between grams and ounces, if necessary, shall be documented on case notes.

9.1.1. For approximate conversions, 28.3495 grams = 1 ounce. 453.592 grams = 1 pound.

10. Uncertainty of Measurement

10.1. Any weights recorded in the case file must indicate the appropriate expanded uncertainty and identification of the balance used.

11. Limitations

11.1. This procedure is for the qualitative analysis and characterization of the Marijuana plant. No quantitative purity values are reported.

12. Documentation

12.1. Not applicable.

13. References

13.1. DFS Departmental Operations Manuals (current revisions).

13.2. Forensic Chemistry Unit SOPs (current revisions).

13.3. Controlled Substances Standard Operating Procedures; Comparative and Analytical Division, Houston Forensic Science Center (Document ID 2923, July 3, 2017)

13.4. *DC Code §48-904.01. Prohibited acts A; penalties* under Chapter 9 of the Controlled Substances Act of DC Code.

13.5. Forensic Science Laboratory Quality Assurance Manual (current revision).

13.6. SWGDRUG Supplemental Document SD-2

13.7. “Drug Identification Bible”, Amera-Chem, Inc., 2011 edition.

13.8. “Recommended Methods for the Identification and Analysis of Cannabis and Cannabis Products,” UNODC, ST/NAR/40, March 2022.